Global Modeling of Secondary Organic Aerosols

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Science and Technology Directorate

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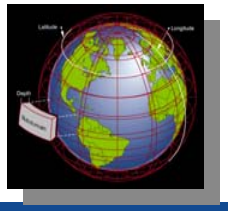
We are adding SOA (secondary organic aerosols) into the IMPACT model (and eventually CAM for SciDAC)



- Secondary organic aerosols can account for 50-80% of organic mass in polluted regions

  (e.g. LA – Turpin and Huntzicker, 1995)

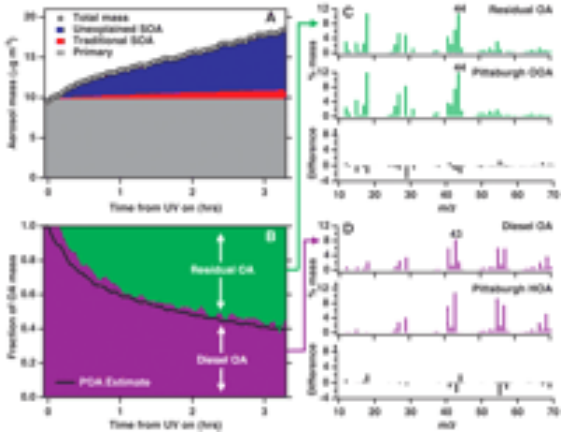
- In 2003 and 2004, acid catalyzed formation of secondary organic aerosols appeared to be important….

  (Jang et al., 2001, 2002)

- Initially it was believed the oxidation of a few high flux species could account for most of the secondary organic aerosol. Now the role of thousands of semi-volatile and intermediate volatile species may be critically important.

Observations of SOAs have given unexpected results…and yielded new hypotheses

- Volkamer, Jimenez, et al. 2006 – Secondary organic aerosol formation from anthropogenic air pollution: Rapid and higher than expected (Geophys. Res. Lett., 2006)
- Robinson, Donahue, et al. 2007, Rethinking organic aerosols: Semivolatile emissions and photochemical aging (Science, 2007)



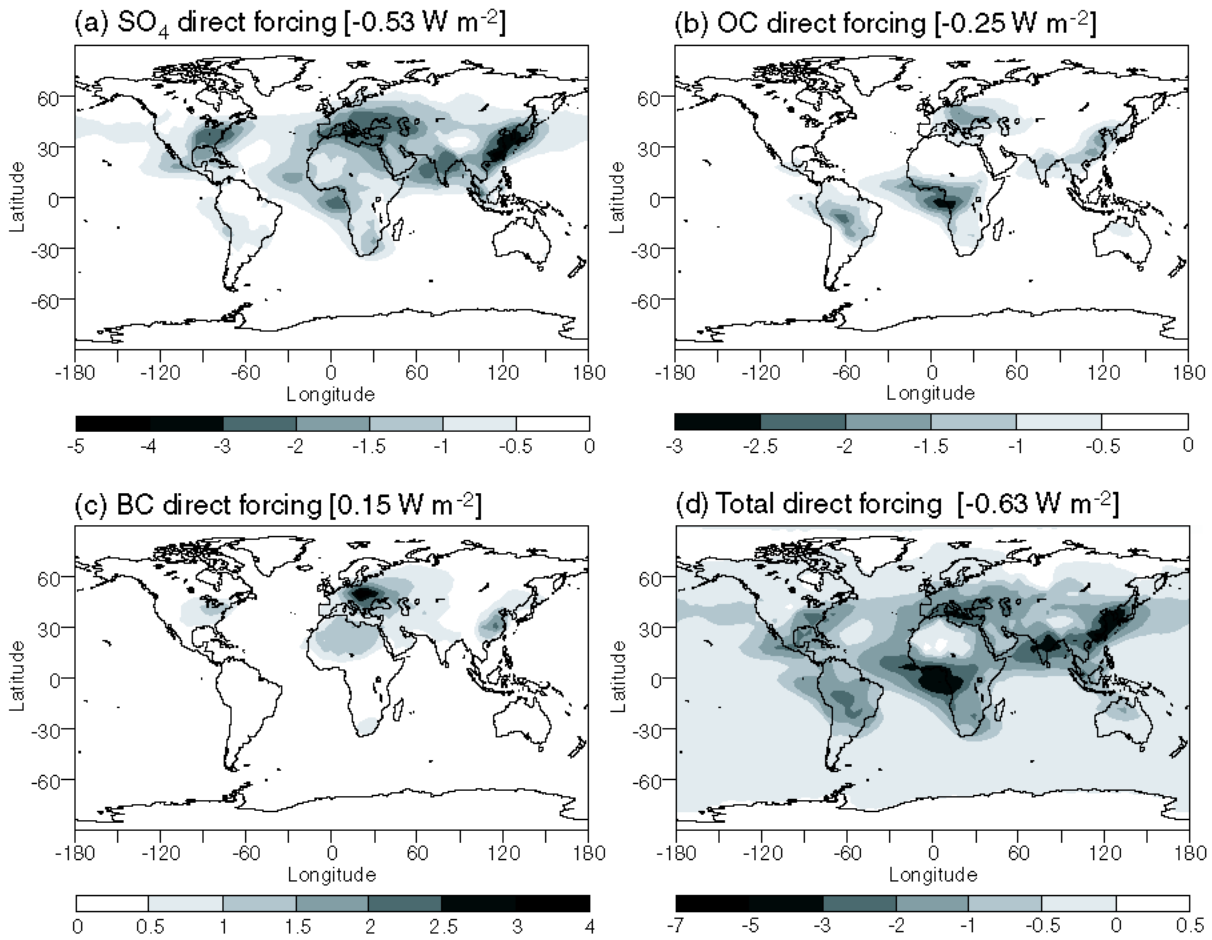
- Donahue, Robinson, Stanier, and Pandis, 2006 – Coupled partitioning, dilution, and chemical aging of semivolatile organics (Environ. Sci. Tech. 2006)

Steve S

We are now working to add a variation of Donahue et al.'s method into IMPACT and CAM

- We have updated nearly 40 emissions inventory files for aerosol and precursor gas emissions
- The SOA mechanism has been added to IMPACT
- Our first simulations are underway, examining:
  - Aromatics
  - Alkenes
  - Terpene
- After testing with IMPACT, the mechanism will also be added to the CAM model as part of ongoing SciDAC work (Cameron-Smith, PI)

We will also be able to calculate the direct effect of SOAs, much like we have done for sulfate, OC, BC



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